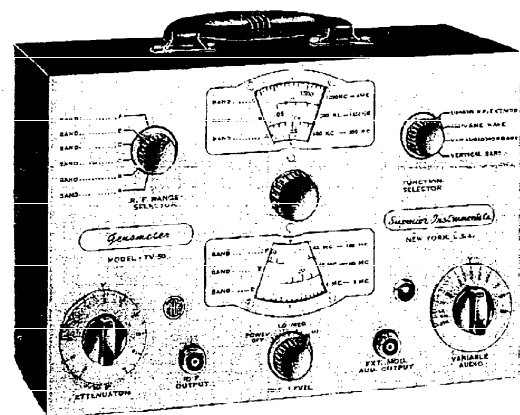
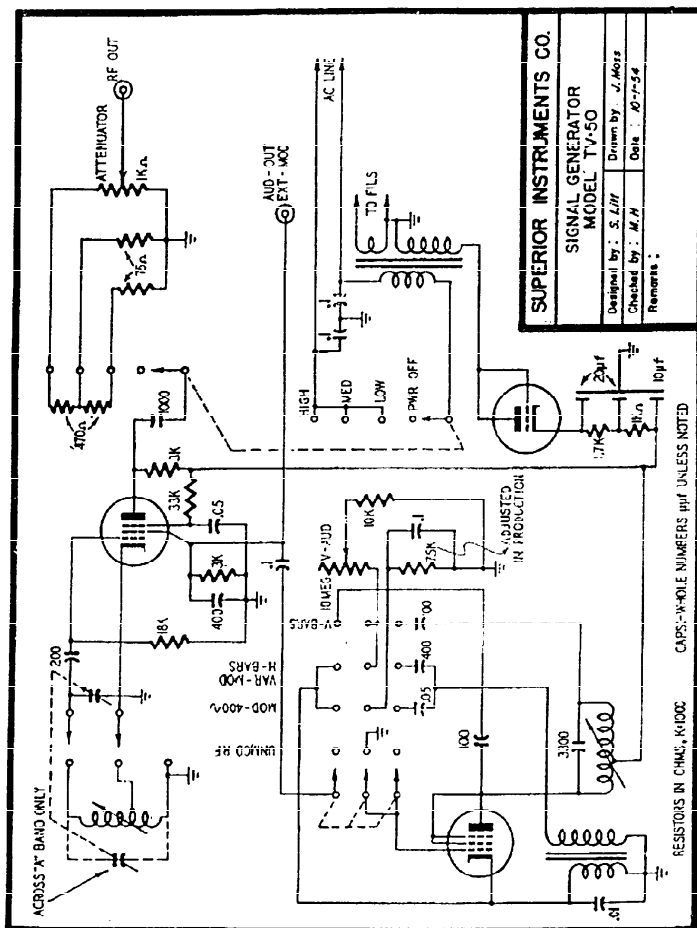


OPERATING INSTRUCTIONS FOR MODEL TV-50 GENOMETER



- ✓ **R. F. SIGNAL GENERATOR**
- ✓ **AUDIO FREQUENCY GENERATOR**
- ✓ **HORIZONTAL AND VERTICAL
BAR GENERATOR**
- ✓ **CROSS-HATCH GENERATOR**
- ✓ **DOT PATTERN GENERATOR**
- ✓ **MARKER GENERATOR**

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R. F. SIGNAL GENERATOR SECTION

An R.F. Signal Generator provides the radio frequency signal sources required to align the intermediate (I.F.) and radio (R.F.) frequency amplifier circuits in both A.M. and F.M. receivers.

The Model TV-50 Genometer provides the following ranges:

Band A	100 Kc.	to	390 Kc.
Band B	390 Kc.	to	1250 Kc.
Band C	1250 Kc.	to	4000 Kc.
Band D	4 Mc.	to	15 Mc.
Band E	15 Mc.	to	60 Mc.

An additional range, Band F, covers the range 45 Mc. to 180 Mc. and is the third harmonic of Band E.

The Model TV-50 provides 3 output levels; low, medium and high. Each of the three levels is individually controllable by means of the calibrated R.F. attenuator control. The R.F. is available separately (unmodulated) or modulated by the built-in 400 cycle sine wave oscillator. The R.F. may also be modulated by the internal 300 cycle to 20,000 cycle variable audio oscillator, or by any external modulating source injected into the Model TV-50 through the "External modulation" jack.

TO USE THE MODEL TV-50 GENOMETER AS AN R.F. SIGNAL GENERATOR

1. Insert the line cord into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the R.F. level switch to any position other than the "power-off" position.
2. Rotate the R.F. range selector switch to the R.F. range desired.
3. Tune the dial to the frequency desired.
4. Set the Function Selector Switch to the type of modulation desired. When set to the "variable audio" position, the modulating frequency will be determined by the setting of the "variable audio" frequency control (300 to 20,000 cycles).
5. Set the "R.F. level" control to the level desired.
6. Connect the output cable to the "R.F. output" jack.
7. Clip the grounded lead (shielded wire) of the output cable to the chassis of the receiver under test and the central conductor lead of the output cable to the grid of the stage to be aligned.
8. Adjust the "R.F. attenuator" control so that an output meter connected to the receiver will read in the lower portion of its scale.
9. Proceed to align the receiver according to the receiver manufacturer's recommendations. If such alignment recommendations are not available, align according to the general alignment instructions appearing below:

GENERAL INSTRUCTIONS FOR ALIGNING A.M. BROADCAST RECEIVERS

When aligning a receiver at an intermediate frequency, the generator's wave switch is set to that frequency and the signal is fed into the I.F. amplifier. This is done by connecting the "hot" lead of the generator to the control grid (or cap) of the stage preceding the stage to be aligned. The I.F. trimmers are then rotated back and forth until maximum output is indicated on an output meter connected across the voice coil of the speaker or in the speaker itself if no output meter is available. After this stage is adjusted, proceed to adjust the other stages in the same way. To align an I.F. stage that has A.V.C. — use lowest possible generator signal output or ground the A.V.C. voltage and proceed as previously outlined. The coils are adjusted until the meter shows resonance. After the I.F. is adjusted, the modulator and oscillator of the receiver must be aligned. Set the signal generator at either 1400 K.C. or 1600 K.C. and adjust oscillator trimmer for maximum signal output. Then set signal generator at 600 K.C. and adjust oscillator padder for maximum output at 600 K.C. Reset signal generator at 1400 K.C. or 1600 K.C. and connect to the antenna and ground posts of receiver and adjust trimmers for maximum output.

IMPORTANT

1. Always connect the shielded lead to the chassis (or B- or ground) of the set.
2. If the set has A.V.C., either "kill" the A.V.C. by grounding it or use minimum output of the Signal Generator.
3. Always work from the last detector stage of the receiver to the antenna stage.
4. Whenever possible use an output meter or connect a low range D.C. Voltmeter between cathode and chassis of the last I.F. or R.F. stage if the set has A.V.C.
5. Always ground the antenna when aligning a receiver.

GENERAL INSTRUCTIONS FOR ALIGNMENT OF F.M. RECEIVERS

F.M. receivers are aligned in a similar manner to A.M. receivers but with the following changes:

1. Connect an electronic Voltmeter or 20,000 ohm per Volt V.O.M. across the limiter grid return resistor.
2. Align all the I.F. stages at the receiver's I.F. frequency (usually 10.7 Mc.) by adjusting the tuning slugs of the coils (or the trimmers across the I.F. coils) for maximum indication on the meter.
3. Place the indicating meter between the center-tap connection of the discriminator transformer and ground.
4. Adjust the secondary of the discriminator transformer for minimum indication on the indicating meter.
5. Change the frequency of the signal generator 250 K.C. above and below the I.F. frequency. The meter should read a positive voltage one way and a negative voltage the other way.
6. If the readings are not identical, showing a higher reading in one direction, adjust the primary of the discriminator transformer until the readings are identical for equal deviation in frequency.

Audio Frequency Generator

AUDIO FREQUENCY GENERATOR SECTION

An audio frequency generator provides the audio frequency signals required to test and check audio and video amplifiers. This type of unit may also be used to check the frequency response of speakers, the turns ratio of transformers, etc.

The Model TV-50 provides a fixed 400 cycle sine wave signal and a variable 300 cycle to 20,000 cycle peaked wave signal. The 400 cycle is used primarily to modulate the R.F. signals generated by the Model TV-50 but it may also be used to check distortion in audio amplifiers. The variable audio range may be used for other audio tests requiring a variable audio signal source as outlined below.

TO USE THE 400 CYCLE SINE WAVE OF THE MODEL TV-50 TO CHECK AN AMPLIFIER

1. Insert the line cord into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the "R.F. level" switch to any position other than the "power-off" position.
2. Set the "Function Selector" switch to the "400 cycle sine wave position."
3. Connect the output cable to the "Audio output" jack.
4. Clip the grounded lead (shielded wire) of the output cable to the chassis of the amplifier under test, and the central wire to the input of the stage to be tested.

Gain of an amplifier stage can be measured by dividing the voltage generated at the output of the stage by the voltage applied to the input of the stage under test. A vacuum tube voltmeter should be used to prevent loading of the amplifier.

Distortion of an amplifier can be seen by noting the variation between the signal applied to the amplifier and the signal reproduced by the amplifier as observed on a cathode ray oscilloscope.

TO USE THE VARIABLE AUDIO RANGE OF THE MODEL TV-50

1. Insert the line cord into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the "R.F. level" switch to any position other than the "power-off" position.
2. Set the "Function-Selector" switch to the "variable audio-horizontal bars" position.
3. Connect the output cable to the "Audio-output" jack.
4. Select any frequency desired between 300 and 20,000 cycles by tuning the "variable audio" dial.

Horizontal and Vertical Bar Generator

HORIZONTAL AND VERTICAL BAR GENERATOR SECTION

A Bar Generator is a special type of signal generator which is used to produce horizontal and vertical equally spaced bars across the face of a television picture tube. The bars are used for adjustment of the television linearity controls.

TO USE THE MODEL TV-50 AS A HORIZONTAL BAR GENERATOR

1. Insert the line cord into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the "R.F. level" switch to any position other than the "power-off" position.
2. Set the "Function-Selector" switch to the "variable audio-horizontal bars" position. The horizontal bars produced by the Model TV-50 can be injected into a television receiver by two methods:

METHOD #1 — (Connection to Ant. Posts — no inside connection)

1. Connect the output cable to the "R.F. output" jack.
2. Clip the output cable ends to the antenna connections of the television receiver.
3. Tune the Model TV-50 to the frequency of a television station, preferably Channels 2, 3, 4 or 5. (Channel 2 = 54 Mc. to 60 Mc. Channel 3 = 60 Mc. to 66 Mc. Channel 4 = 66 Mc. to 72 Mc. Channel 5: 76 Mc. to 82 Mc.)
4. Adjust the "Variable Audio" knob to a frequency having an adequate number of bars (between 600 and 2,000 cycles). (Raising the frequency increases the number of bars, lowering the frequency reduces the number of bars.)
5. Adjust the television receiver vertical linearity controls for equal spacing between bars.

METHOD #2 — (Direct connection to video amplifier)

1. Connect the output cable to the "A.F. output" jack.
2. Clip the output cable ends across the video detector load resistor (usually 3900 ohms) or across the input to the video amplifier.
3. Adjust the "variable audio" knob to a frequency giving an adequate number of bars (between 600 and 2,000 cycles). (Raising the frequency increases the amount of bars projected on the television screen and lowering the frequency reduces the amount of bars.)
4. Adjust the vertical linearity controls of the television receiver for equal spacing between bars.

Horizontal and Vertical Bar Generator

TO USE THE MODEL TV-50 AS A VERTICAL BAR GENERATOR

1. Insert the line cord into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the "R.F. level" switch to any position other than the "power-off" position.
2. Set the "Function-Selector" switch in the "Vertical Bars" position.

The Vertical Bars can be injected into a television receiver using the two methods outlined above (See Horizontal Bar instructions). The "Variable Audio" knob will have only a slight effect on the amount of vertical bars produced.

A third method of injecting vertical bars into a television receiver is possible, and might be necessary in receivers which have selective horizontal amplifier circuits.

1. Insert the line cord of the Model TV-50 into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the "R.F. level" switch to any position (preferably the "high") other than the "power-off" position.
2. Set the "Function-Selector" switch in the "Unmodulated R.F. External Modulation" position.
3. Turn the "R.F. Range Selector" switch to Band A (100 Kc. — 390 Kc.).
4. Connect the output cable to the "R.F. Output" jack.
5. Clip the output cable ends across the video detector load resistor (usually 3900 ohms) or to the first video amplifier tube.
6. Tune the dial of the Model TV-50 until the required amount of vertical bars appears across the picture tube screen. The amount of vertical bars produced will be:

<u>Frequency</u>	<u>Bars</u>
110.25 Kc.	7
126.00	8
141.75	9
157.50	10
173.25	11
189.00	12
204.75	13
220.50	14
236.25	15
252.00	16
267.75	17
283.50	18
299.25	19
315.00	20

The bars indicated above are based on actual calculation. Misadjustment of the width and horizontal linearity controls will cause some bars to go past the picture tube edges and therefore out of view. Readjust controls for number of bars specified.

7. Adjust the linearity of the television receiver by means of its linearity controls.

Cross-Hatch Generator

CROSS-HATCH GENERATOR SECTION

A Cross Hatch Generator is a special type of signal generator which is used to produce a cross-hatch pattern consisting of horizontal and vertical lines criss-crossing the face of a television picture tube. The pattern is used for adjustment of the television linearity and focus and for correct positioning of the ion trap.

TO USE THE MODEL TV-50 AS A CROSS-HATCH GENERATOR

1. Insert the line cord of the Model TV-50 Genometer into any 105-130 Volt, 60 cycle A.C. Power Source. Turn the instrument "on" by turning the "R.F. level" switch to the "high" position.
2. With the "Function-Selector" switch set to the "unmodulated R.F. — External Modulation" position, turn the "R.F. Range Selector" switch to Band "A."
3. Tune the dial of the Model TV-50 to 189 Kc. (Color dot frequency).
4. Connect the output cable to the "R.F. Output" jack.
5. Clip the ends of the output cable to the first video amplifier input. The picture tube should now reproduce 12 vertical lines.
6. With the dial set so that 12 vertical lines are projected on the picture tube screen, set the "Function Selector" switch to the "variable audio-horizontal bars" position.
7. Set the "variable audio" control to 500 cycles. A cross-hatch pattern should now be projected on the picture tube screen. It may be necessary to adjust the control slightly above or below the 500 mark for better stability. It is also recommended that the TV set horizontal and vertical hold controls be adjusted to assure a greater degree of stability.

Dot Pattern Generator

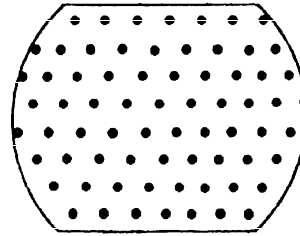
DOT PATTERN GENERATOR SECTION

A dot pattern generator is a special signal generator used to produce a dot pattern on the face of a color picture tube. It is used to adjust the convergence between the various colors produced by the color tube.

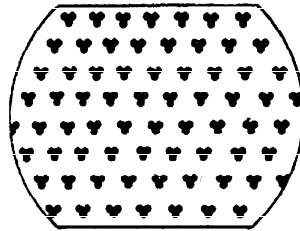
TO USE THE DOT PATTERN GENERATOR

1. Insert the line cord of the TV-50 Genometer into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the "R.F. level" switch to the "high" position.
2. With the "Function-Selector" switch set to the "unmodulated R.F. — external modulation" position, turn the "R.F. Range Selector" switch to Band "A."
3. Tune the dial of the Model TV-50 to 189 Kc. (dot frequency).
4. Connect the output cable to the "R.F. Output" jack.
5. Clip the ends of the output cable to the first video amplifier input. The picture tube should now reproduce 12 vertical lines.
6. With the dial set so that 12 vertical lines are projected on the picture tube screen, set the "Function Selector" switch to the "variable audio-horizontal bars" position.
7. Set the "variable audio" control to approximately 500 cycles. A cross-hatch pattern will now be projected on the picture tube screen.
8. Reduce the brightness setting of the receiver until both the vertical and horizontal lines just disappear. A dot pattern will be left upon the picture tube screen.
9. By means of the convergence controls of the receiver, adjust the color convergence until the dots produced are clear and distinct with little or no overlap of color.

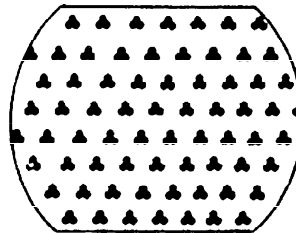
Dot Pattern Generator



If all controls and circuits are in proper alignment, the resulting pattern will consist of a sharp white dot pattern on a black background. One or more circuit or control deviations will result in fuzzy overlapping dot patterns.



A dot pattern out of convergence. Note red and green dots above center blue dot. Trouble is due to low blue convergence Voltage. Adjust accordingly.



A dot pattern out of convergence. Note blue dot appears above red and green dots. Trouble is due to high blue convergence Voltage. Adjust accordingly.

Various other misalignments will result in abnormal dot patterns. A few are described below:

TROUBLE

Dot pattern in convergence at center — out at ends.

Dot pattern in convergence at center — out at top and bottom.

Blotches of color blocking out dot pattern.

CAUSE

Poor horizontal — Dynamic convergence.

Poor Vertical — Dynamic convergence.

Purity control out of adjustment.

Marker Generator

MARKER GENERATOR SECTION

A Marker Generator is a signal generator used in conjunction with a sweep generator to locate specific frequencies across the swept band.

The Model TV-50 includes the most frequently needed marker points. It was impractical to use crystals because of the large number of marker points required. We therefore used the "calibration against standards" method. This is accomplished by actually calibrating each range against precise laboratory standards with particular adjustments at the marker points.

TO USE THE MODEL TV-50 AS A MARKER GENERATOR

1. Insert the line cord into any 105-130 Volt, 60 cycle A.C. power source. Turn the instrument "on" by turning the "R.F. level" switch to any position other than the "power-off" position.
2. Set the "Function Selector" switch to the "unmodulated R.F.-External Modulation" position.
3. Turn the "R.F. Range Selector" switch to the desired range. (See table below for marker points.)
4. Tune the dial to the marker frequency.
5. Connect the output cable to the "R.F. output" jack.
6. Clip the output cable leads to the "External Marker" terminals of the sweep generator. If no "External Marker" terminals are provided on the sweep generator, clip the cable ends across the identical points to which the sweep generator is connected. The marker "pip" will be seen along the curve of the sweep generator on the oscilloscope screen.

<u>Marker Point</u>	<u>Appears on Band</u>	<u>Used for</u>
189 Kc.	A	Color Dot Pattern
262.5 Kc.	A	I.F. Freq.
456 Kc.	B	I.F. Freq.
600 Kc.	B	Osc. Adj. B'cst. Band
1000 Kc.	B	Standard Marker Point
1400 Kc.	C	Osc. Adj. B'cst. Band
1600 Kc.	C	Osc. Adj. B'cst. Band
2000 Kc.	C	Standard Marker Point
2500 Kc.	C	Standard Marker Point
3579 Kc.	C	Color Burst Freq.
4.5 Mc.	D	TV Inter-carrier Sound
5.0 Mc.	D	Standard Marker Point
10.7 Mc.	D	F.M., I.F. Freq.

CALIBRATION AND SERVICE NOTES FOR MODEL TV-50 GENOMETER

CALIBRATION NOTES

Your Model TV-50 was originally calibrated at the factory using precise laboratory standards. Calibration for bands A to D is set by adjusting the slugs for each band against our standards. Band E is adjusted by compression of the air-wound coil. (Band F is a harmonic of Band E).

The original calibration adjustments should hold under normal conditions for a period of 5 years. It is possible, however, that one or more of the adjustments could shift due to mechanical damage and other impacts. You can re-adjust in such cases only if you have available suitable standards. We are listing below the standard required for each band. (If you do not have standards available, we suggest return to factory.)

<u>Standard Required</u>	<u>For Band</u>	<u>Adjust for</u>
100 Kc.	A	200 Kc.
100 Kc.	B	1000 Kc.
100 Kc.	C	1500 Kc.
1000 Kc.	D	5 Megacycles
5 Megacycles	E	20 Megacycles

SERVICE NOTES

1. If you cannot obtain an R.F. signal but can obtain audio signals, the trouble is probably due to a defective 6BE6 oscillator tube.
2. If you can obtain an R.F. signal but cannot obtain audio signals, the trouble is probably due to a defective 6BE6 modulator tube.
3. If you cannot obtain either R.F. or Audio signals, the trouble is probably due to a defective 7193 rectifier tube.
4. Overall hum is due to a defective electrolytic.
5. Inability to obtain a vertical bar pattern (bars slant) with function switch in "Vertical Bar" position can be corrected by adjusting the slug of the vertical bar coil. (It is located between panel and 6BE6 modulator tube.)